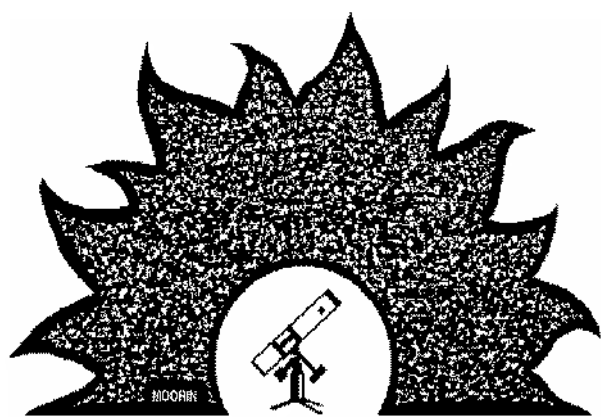




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Venus Transit Volume 65 Special Issue

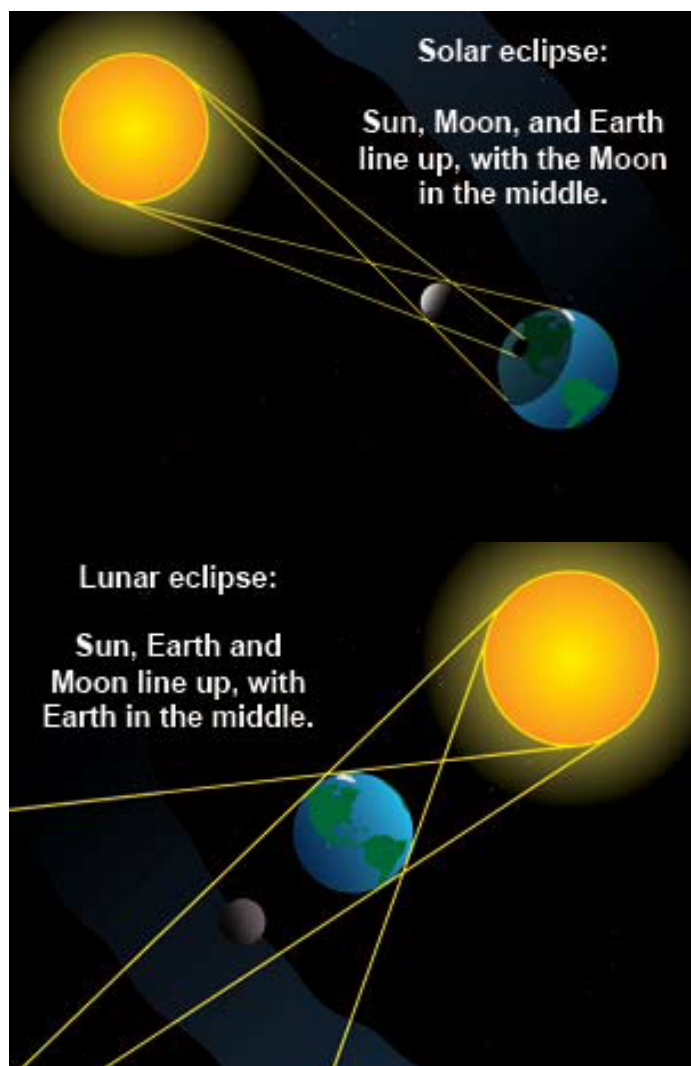
PHOENIX ASTRONOMICAL SOCIETY — ESTABLISHED 1948



ECLIPSES & TRANSITS

An eclipse happens when one object in space gets right in front of another object in space. Seeing that happen is awesome! And it is a chance to learn more about one or both of the objects.

Depending on what gets in front of what, we have different names for the eclipse.



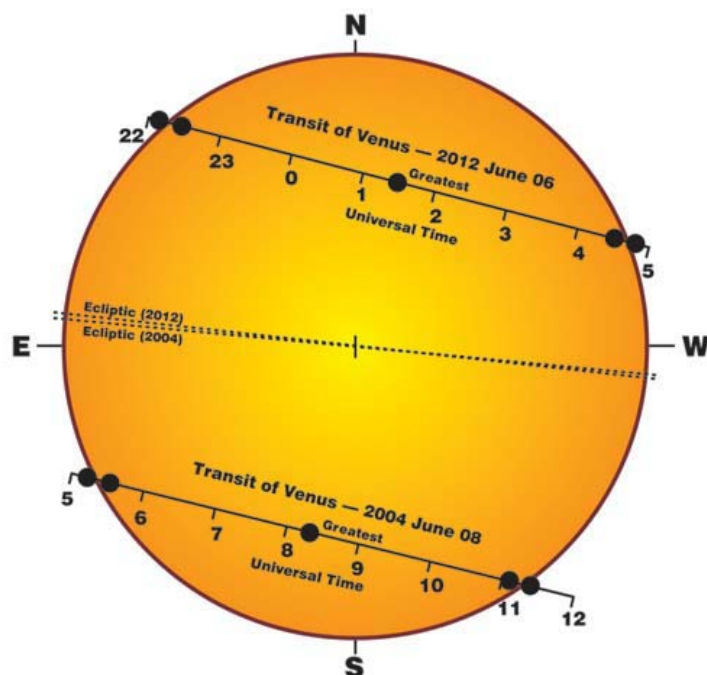
When the Moon passes between us and the Sun, we call it a solar eclipse. It is the Sun that is being "eclipsed" (*meaning hidden or blocked from sight*).

To form an eclipse, the two objects and the observer must be located along a straight line.

When Earth passes right between the Sun and the Moon, we get a lunar eclipse.

These are the most notable eclipses we see on Earth. During a solar eclipse, daylight gets dimmer for a few minutes, then returns to normal. During a lunar eclipse, the Moon may look like an orange ball. We can still see it because it reflects some sunlight that has grazed Earth's atmosphere, becoming reddened and scattered by the atmosphere as if at sunset.

There is one other very rare eclipse that we can also see happening before our very SHIELDED eyes. That one is called a "Venus transit." Venus orbits closer to the Sun than Earth does. Sometimes Venus passes between Earth and the Sun. When things are lined up



just right, we can see Venus as a small black dot moving across the face of the Sun.

How often can we see a Venus transit?

The answer is—not often! If you are more than 8 years old, you have been very lucky, because there have already been two Venus transits during your life. One was occurred June 5 and 6, 2012. The previous one occurred in June 2004.

But after 2012, the next one will not occur until 2117! You will have wait until way past your 100th birthday to see the next one. Since the invention of the telescope, Venus transits have occurred in:

1631 (not witnessed) & 1639

1761 & 1769

1874 & 1882

2004 & 2012

Why are Venus transits so unpredictable?

At first, you might think the "schedule" of Venus transits sounds pretty random. But there is a pattern:

Two transits 8 years apart,

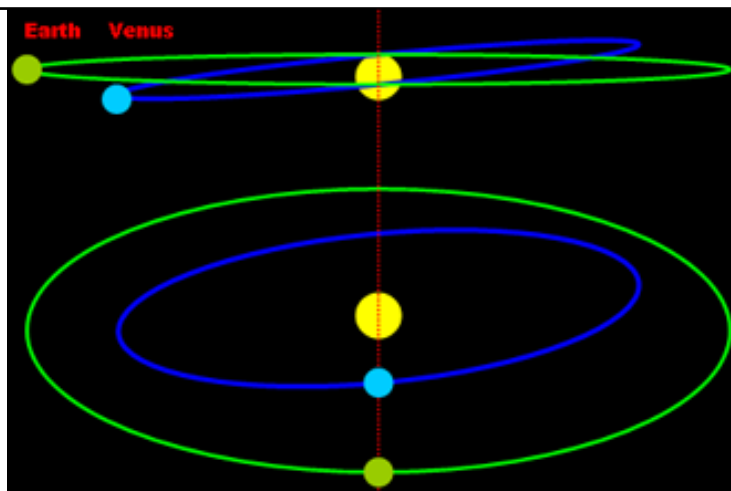
Then 105.5 years with no transits,

Then two transits 8 years apart,

Then 121.5 years with no transits,
for a total cycle of 243 years.

So why don't we see a Venus transit more often? Several reasons.

Since Venus orbits closer to the sun than Earth does, it has a



shorter distance to go to make one "lap." For every 8 laps Earth makes, Venus makes about—but not exactly—13 laps. That means Venus passes us up five times about every 8 years, or once about every 1.6 years.

But we don't see Venus lined up in front of the sun every 1.6 years because Venus's orbit is tilted a bit from Earth's orbit. So when we would expect to see Venus passing us up, it is either above or below the Sun, so we don't see it. We see it only if at just that time in its orbit, it happens to be crossing Earth's orbit.

Also, neither orbit is exactly circular, which throws off the rhythm of the dance just a bit more.

Venus Transit & Star Party at PVCC Black Mountain Campus June 5

Photos of this event can be viewed in the PAS Photo Gallery at this link: http://www.pasaz.org/forums/gallery.php?g2_itemId=11385

Terri Finch writes: The Venus Transit & Evening Star Party was a blast! We had an awesome turnout. I estimate we saw over 800 people from the public. I had a sign in sheet available and asked that one person from each family, sign in. We filled 16 of the pages, with 15 names & emails on each page.

Many thanks goes to the Telescope Team! In attendance was Don Boyd, Marc Levison, Albert Tucker, Steve Machol (who became a member of PAS on this day), Eric Steinberg for evening viewing, Rod & Sue Sutter, Bob Ewing (a new PAS Member), William & Terri Finch, and Chris & Tiffany Johnson. Also in attendance from PAS but not with a scope were Mel & Vi Cantrell (recently joined PAS), Mike Webb, Joe, Renee & Kat Collins, Megan Housholder & her sister Caroline, & Tim Cook. From PVCC we had attendance by Jenny & her

husband Dave Weitz, Dave Hellman with a solar filtered scope & a PST piggybacked on the scope, Casey Durandet, Mike Swingler, Kevin Adams (PVCC Student) who was my photographer. Also from ASU West, Paul Schmidtke.

The plan was to set up a few canopies to hide under during the daytime, and take them down for the night time viewing. However, the bursts of wind, which were about 30mph, made the group decide not to set up the canopies, so we all roasted in the sun. But many, many thanks are given to Chris, who provided a pop up tent trailer with A/C as a refuge for those who needed a mini break to get away from the heat. Some of us used it.

PAS Provided the bottled water. 5 cases were purchased for use for this event and thanks goes to everyone who supplied coolers with ice to put the bottled water into. If it weren't for the waters, I think several of our members would have passed out during the event.

I wish to thank those members who

helped me during the event. Tim Cook took over the sale of Solar Glasses. Thank you Tim. Awesome job. And Megan & Caroline helped with Q & A in the evening hours. Mel helped me out a bunch by having me take a break in the shade when it looked like I was about to pass out. Mike Webb was very helpful with the clean up of the event. During the daytime event, Marc Buckhaut from the Foothills Focus interviewed me.

We had several out of town guests. Chris Boar came to us from Vancouver Island, Canada. Ted Blank came to us from New Hampshire. John Lund joined us from Boston. Robert Fenske joined us from San Antonio.

So, here's how the event went.... I set up a table to do demos, but didn't really find time to do that. I set up the Doctor and William took care of keeping the Sun & Venus present in the eyepiece with a solar filter. The lines weren't that long as it appeared that people arriving, would stay long enough to go through the all the scopes, once, maybe twice, and then depart. A few hung

Venus Transit & Star Party at PVCC Black Mountain Campus June 5

around and chatted. I had Mega, Caroline & Tim workin the front table for a while. Next to the demo table was the handouts, and the sign in sheet which we asked everyone to sign in, one member per family. When people arrived, they saw Dave's scope first, if they didn't see my table. Then they could pass by the table and go to the rest of the telescopes. I saw Chris & Marc doing Astrophotography. So, when the people came to the table, i told them to "look through all the scopes, however, if you see a camera stuck on the end of a scope, that person is photographing Venus, and you should skip that scope and move on to another." Several of our people were there to do photography.

As the day went on, the heat went up until about an hour before sunset, when the temperatures were so much nicer. Then the Sun set, and many of us took a dinner break at Bad Donkey. The evening began, and i was still eating when Saturn popped out. I showed Mars first, because everyone else was on Saturn. Then I did Saturn, and I never did get to the Moon. My plan was to take the Moon but it didn't rise high enough to get a good view until about 9:30, and by then, people were talking about packing it in. Security came by about 9:40 to turn on the lights, and we still had public there, so I asked for 10 more minutes, walked around and announced it, and the lights came up, we packed it in. It was a very fun, exciting, exhausting day and too much fun in the Sun for some of us. Many thanks goes to Jenny for providing sun-screen. I had sun screened myself before i left the house, but borrowed Jenny's when Don decided to put some on himself. William didn't put any on and got burnt on his left side of his face and neck, as that is the side that was facing the sun all day. Jenny was able, in her dress, not to get burnt, as she kept putting on the sunscreen.

Many thanks to Loretta Mondragon for all her help getting the PVCC Black Mountain Campus part of the event ready for the event with all the helpers around the campus. Many thanks to Jenny Weitz who did a bunch of help during the event. PVCC Main Campus provided the flashing lights under the scopes for the evening viewing. Jenny also brought the PVCC Sun Spotter out to use, and that was a great way to show many people at one time, the sun spots and Venus on the sun. Many thanks goes to my Tele-



Photo taken by Alex Vrenios at the 2nd point of contact, showing the "black drop" effect. He used a Nikon D700 through an 18mm eyepiece on CPC 1100. He was at his home in Phoenix.



Photo by Bob Ewing, PAS Member, using a Nikon D60 and Nikkor AF-S lens at 200mm, taken at the PVCC Venus Transit Event.

scope Team & PVCC Team, for without them, this event would not be a success. Thank you all! It was a day to remember! See the photos that were taken by various PAS Members, Kevin Adams, & others in the PAS Photo Gallery, soon.

Jenny was interviewed about the event

the morning of. Here's the link to that interview (provided to me by Kevin Adams) <http://www.azcentral.com/community/scottsdale/articles/2012/05/30/20120530pvcc-celebrate-venus-sun-crossing-paths.html>

Jody Cummings (Guest) writes: A huge THANKS!!!! to you, Terri, and the

Venus Transit & Star Party at PVCC Black Mountain Campus June 5

rest of the Phoenix Astronomical Society for hosting this event at PVCC Black Mountain. It was a great afternoon and evening of sky watching, and I am the envy of my friends around the country who share my celestial interests but for various reasons weren't able to view the transit. (I think I really am the only one among those who wanted to see it who was able to. Not even my husband was able to go.) Major kudos to all who made sure that those of us who don't have solar-watching equipment were still able to participate.

Jenny Weitz (PVCC Astronomy Teacher) writes: Two friendly YMCA camp counselors came over to look at the transit and were very impressed. They wanted to show their 50 little campers but worried about being able to control the kids amongst the telescopes. Instead I brought the sun-spotter over to the Y and the kids got to see the transit in groups of three. I encouraged community members using the Y to head over to the telescopes to see more. My husband and father-in-law made a rare appearance to see the transit for themselves. Later in the evening many folks from PVCC's science division stopped by to see the star party. The moon even made an appearance shortly before our helpful security guard, Kevin, had to switch the lights back on.

Robert Fenske writes: Your club members were very friendly and made the event enjoyable. I even helped out more than I had expected as many people took a view of the transit through my binoculars that had solar filters attached in front of the objectives.

Bob Ewing (PAS Member) writes: Thank you for the invite and the wonderful Transit party at PVCC !! Nice to see so many folks. My photos came out OK... pretty small because I used a 200mm telephoto. (no telescope) ! Hope the evening star party went well. Sorry I was tired and very hungry and hot.... so I bailed... but I will see you at the evening star parties up there later in the year.

Chris Boar (Guest) writes: I was the British guy who flew down from Vancouver Island, Canada to view the transit with you, and I had quite a few folks ask if I could send them some of the images I took, So I've posted them on my business Facebook page. You can see/access them at this

link:

<http://www.facebook.com/media/set/?set=a.10151018371455465.472890.344503075464&type=1>

Chris also wrote his own, separate review, for which you will find in this issue named "Review of the Venus Transit, 5th June, 2012. Phoenix AZ." Enjoy.

Dhiren Joshipura (Guest) writes: Hi Terri, Thanks for organizing one of the greatest celestial events of my life-time. We thoroughly enjoyed it. Thanks again for hosting the event for public.

Laurice Dee writes: Went from one telescope to another on the viewing grounds at Paradise Valley Community College [PVCC] at Black Mountain to take a good look at Venus while she passed in front of the sun. Asked a bunch of questions and was able to get a good feel for the orientation of Venus and the sun during the transit. Used my smartphone to take a number of photos of the transit. Used a pair of special viewing glasses to gaze at Venus during her transit. Ran into a friend on the grounds -



Photo by Chris Boar taken with a Nikon D3s, about f11, 2000sec exposure. Taken at the PVCC Venus Transit Event.



Photo taken by Don Boyd at the PVCC Black Mountain Campus Venus Transit Event. Don took these photos with his Pentax K10 with a short zoom.

Venus Transit & Star Party at PVCC Black Mountain Campus June 5

great to see her again. Faced the sun with my eyes closed to take in the specialness of the extraordinary event. Witnessed the sunset with both Venus and the sun setting together. Enjoyed my chats with Joe Collins and his wife, Renee, while enjoying the view of the night sky. Had a great time with Joe, Renee, and their daughter, Katerenna, at Denny's for post-midnight breakfast. Truly treasured La Luna's company while driving back home. Since she was in her waning gibbous phase, she could not have been more beautiful!

The 2012 Venus Transit is one that I will never ever forget! I am so grateful that the weather turned out to be perfect for the special event with complete sunshine, despite the temps hovering in the low 100s. Such beautiful memories will always be treasured for a very long, long time!

Don Boyd writes: I saw the teardrop effect and it was very cool. I had many comments that people liked the image of the sun thru my scope. After the sun went down I viewed Saturn, the Beehive Cluster, M44, the Stargate Cluster in Corvus, STF 1659 (which Terri said looked like a Klingon Bird of Prey...and everyone I mentioned it to, agreed) which is named after the stargate in the Buck Rodgers movies, not the more recent movie and TV show. Just before we started taking down the scopes, I showed the Moon.

Eric Steinberg writes: I participated in the Venus Transit event as an observer only, bringing my scope for the evening viewing. I definitely enjoyed circulating among the various scopes and imagers, watching naked-eye with sun viewing "glasses," and answering as many questions as I could for the public. I particularly liked the Sunspotter. From my perspective, the best white-light view was through Albert's Takahashi 102 with a newly acquired 24mm ES eyepiece; the best H α view was with a person named Mark and his 85 mm scope with tunable filters.

For the evening part, I showed Saturn for most of the time, to the usual exclamations and sometimes incredulity. Later I showed M5, M13, M57 and Alberio.

Craig & Celeste Adamson write: We had a great time at the Venus Transit. What an incredible thing to see another planet, roughly the size of Earth, past in front of the sun. Everyone was great at answering our



Photo by Bob Ewing, PAS Member, using a Nikon D60 and Nikkor AF-S lens at 200mm.



Photo by Chris Boar taken with a Nikon D3s, about f11, 2000sec exposure. Taken at the PVCC Venus Transit Event.

questions and eager to help us see the transit, explaining the different types of telescopes and filters used to view with. Great information for those of us just getting started with the hobby. We will be checking your website for other activities and will be attending a workshop. Thank you all for allowing us to attend and all your efforts at putting on such a great viewing session.

Joe Collins writes: I really enjoyed the event, especially because I did not bring my telescope. For a change I was able to spend time talking with Laurice Dee and other event participants and look through their scopes.

Arizona Sky - All Aboard the Venus Transit!

By Leah Sapir

On June 5, 2012, a rare event was seen from Arizona, that will not be seen again in our lifetimes: a Venus transit, where we were able to view the planet Venus moving across the bright disk of the Sun. Venus transits take place in pairs, eight years apart, about once in 120 years. The “other half” of the pair took place on June 8, 2004; it was visible from Europe, Africa and Asia, and partly visible from the eastern US, but it was not visible at all from the western US. The next pair of Venus transits will be in December 2117 and 2125.

A transit occurs when either Venus or Mercury passes between us and the Sun. In this it is similar to an eclipse, where the Moon passes between the Earth and Sun. But, why does the Moon completely block out the Sun during an eclipse, and Venus is barely noticeable as it makes its transit? The three main reasons are: location, location, location! The Sun’s diameter (865,000 miles) is about 400 times that of the Moon (2160 miles); but the Sun is also about 400 times as far – 93 million miles compared to the Moon’s 239,000. As a result, the angular diameter of the Sun and Moon (the amount of space they appear to take up in the sky) is about the same – about $\frac{1}{2}$ of a degree. While Venus, with a diameter of 7500 miles – almost as large as Earth – is about 25 million miles from us (almost 4 times as large as the moon, but 100 times farther away), which reduces its visual diameter to a tiny dot on the Sun’s surface, making it appear no larger than a sunspot.

Why are Venus transits so rare? Since Venus should pass between the Earth and Sun each time it orbits the Sun, why don’t we see a Venus transit more often?

Although most objects in the solar system orbit in approximately the same plane, there are slight differences between the plane of orbit of one object compared to another. The plane of the orbit of Venus is inclined by about 3 degrees from the plane of Earth’s orbit (which is also known as the ecliptic). The planes intersect at two points, called “nodes”. Venus will appear to pass directly in front of the Sun only if it happens to be at one of the nodes when it is in the point of its orbit that places it between the Earth and Sun; otherwise (and this is what usually happens) it will appear a bit above or below the Sun rather than transiting across the Sun’s disk.



Photo by Chris Boar taken with a Nikon D3s, about f11, 2000sec exposure. Chris was visiting PAS from Vancouver Island, BC, Canada.

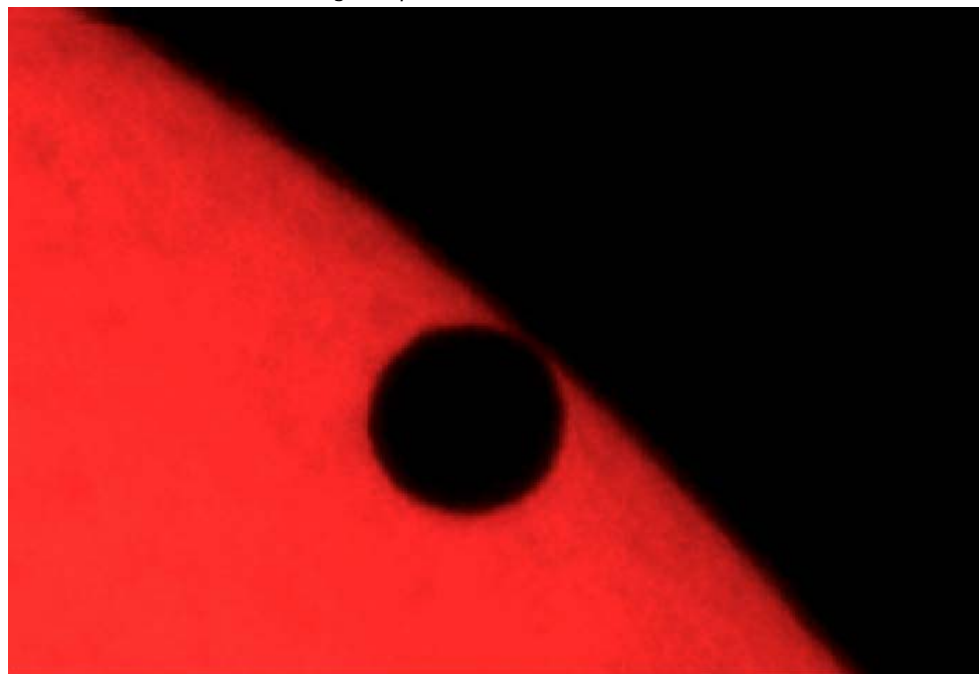


Photo by Dan Heim: Optics: Takahashi FS-128, eyepiece projection @ 104X, Coronado SM40 H-alpha filter Imaging: Meade B/W Electronic Eyepiece (ca.1908s) into Sony Digital 8 TRV310 camcorder Location: Heimhenge, New River, AZ

Mercury transits happen more frequently – about once in seven years, on average, since Mercury orbits the Sun more often. We saw a transit of Mercury in November 2006, and the next two will be in May 2016 and November 2019. Both of the upcoming transits should be visible from the US, including Arizona, for at least part of their duration.

Since transits can only be seen through a telescope, no one was able to view transits until the invention of the telescope in the 17th century. In 1627, Johannes Kepler predicted that there would be a Venus transit in 1631. He was able to determine the expected date, but was not able to pinpoint the time. He recommended that astronomers watch for it on that date and several

Arizona Sky - All Aboard the Venus Transit!

did, but it was not sufficiently visible from Europe for them to see it; in most parts of Europe, the transit was over before sunrise. The transit would have been much more visible from Australia and parts of Asia, but nobody there had a telescope.

Based on further calculations, Kepler expected an “almost-transit” in 1639; he thought that Venus would almost but not quite pass over the Sun’s disk. But in October 1639, the young English astronomer Jeremiah Horrocks reviewed and revised Kepler’s calculations, and determined – only a few weeks before the expected time – that there would in fact be a transit. He predicted not only the date but even the hour when the transit would begin. Horrocks and his friend William Crabtree were thus able to observe the transit from two different locations in England, and were the first humans to see this rare event – even though cloudy weather almost prevented them from viewing it. Horrocks used a telescope to project the image of the Sun and Venus on a piece of paper and measured the angular size of Venus. He then used this data to estimate the distance from Earth to Sun as being around 59 million miles – which is about 2/3 the actual distance, but was a more accurate measurement than any other till that time.

In 1663, the Scottish mathematician James Gregory realized that a transit of Venus or Mercury could provide the necessary data for determining the size of the solar system. Kepler’s laws enabled astronomers to determine the distance of each planet from the Sun, but only in relative terms. For example, using Kepler’s Third Law and the length (in time) of each planet’s orbital period, the distance of each planet from the Sun can be calculated in astronomical units, i.e. in multiples of the Earth’s distance from the Sun. But, how large was an astronomical unit?

Gregory realized that if a transit was observed and its length was timed from various points around the world, the measurements would differ due to parallax. Then, using these various measurements and a bit of trigonometry, it would be possible to calculate the Earth’s distance from the Sun in miles; and then the distances of all the other planets would be known as well. (If you like math, here is a description of how it is done: <http://tinyurl.com/bm5lrol>)



Photo taken by Paul Schmidtke "Looking back at the Transit of Venus" - taken with a Canon EOS SLR while enjoying the Transit at PVCC Black Mountain Campus.



Photo by James DeSantis. James writes: The filter I used gives a really good yellow image of the sun but it came out a bit more orange in my photo.

Edmund Halley tried to make such a measurement during a transit of Mercury in 1676, but this did not provide a sufficiently accurate measurement. Halley realized that a Venus transit would give more accurate data, and recommended that astronomers plan ahead for the Venus transits of 1761 and 1769, and travel to various places around the world to measure the length of the transit. This in fact was done, with astronomers travelling to remote areas of Asia, Africa, the Americas and the Pacific to observe the transit from as many different locations as possible. An entertaining

description of their voyages can be found in this article: <http://tinyurl.com/c7c83pw>

The resulting measurements gave a length for the astronomical unit within 1% of its currently-known value. Quite an accomplishment for 18th century astronomers!

Moreover, while the Russian astronomer Mikhail Lomonosov was observing the Venus transit in 1761 from the Petersburg Observatory, he saw a slight halo around Venus at the beginning and end of the transit. He correctly concluded that this must be an atmosphere, the first time that one had

Arizona Sky - All Aboard the Venus Transit!

been observed around a planet other than Earth.

These measurements were improved in the next pair of transits: 1874 and 1882. The transit of 1882 was also the first to be photographed.

One of the problems that astronomers encountered in timing the transits was the “black drop effect” in which the image of Venus appears spread out and somewhat indistinct when it is near the Sun’s edge. This made it difficult to measure exactly the timing of the 2nd and 3rd contact points. The “black drop effect” was apparently due to turbulence in the Earth’s atmosphere. It was less apparent in the observations of 2004 and 2012; but by that time the size of the astronomical unit had been determined by other methods, and transit-timing wasn’t as essential.

The 2012 transit, however, was a source of other new scientific data. Scientists used the opportunity to refine and calibrate their techniques for discovering exoplanets. One of the methods in searching for exoplanets is to measure the tiny reduction of a star’s light when a planet transits across it. The Venus transit enabled measurement of the apparent diameter and light dip for a planet of known size across a star of known luminosity. Scientists were also able to compare their spectrographic observations of Venus’s atmosphere during the transit, with those obtained in transits of exoplanets.

Who knows what scientists will be able to learn during the next Venus transits in 2117 and 2125!



Photo by Kevin Adams, PVCC Student. Kevin used a Canon Rebel T3. Kevin was with us at the PVCC Venus Transit Event.



Photo taken by Kevin Adams at the PVCC Venus Transit Event showing (in red) Marc Levison & his scope, and Mikey Webb beside him.

The Transit That Almost Got Away

By Leah Sapir

In June 2004 I had been lucky. I happened to be in Israel on June 8, 2004, and saw the first Venus transit of our century from beginning to end. The astronomy students at Tel Aviv University had organized a special public event with filtered telescopes, educational exhibits, and lectures about the solar system. You can read about my adventures in the September 2004 PAS-Times newsletter (<http://www.pasaz.org/PAStimes/2004-2005/2004-09.pdf> - see p. 4).

That transit wasn't visible from Arizona, and I was lucky to be in one of the few places where it was possible to see the whole transit. But for June 2012, when the second transit would be visible in Arizona, I certainly planned to be in Phoenix to watch it with PAS.

However, my plans changed when I learned of another momentous event that was scheduled to take place at the end of May/beginning of June: the birth of my new granddaughter in Israel. I knew that I would want to be in Israel to welcome her as soon as possible after she arrived, and I tried to get a flight that would enable me to either be in Phoenix on the afternoon of June 5, or in Israel on the morning of June 6, to be able to see part of the transit in one of those places. But the only flight available for that time frame was leaving Phoenix on the morning of June 5, and arriving in Israel on the afternoon of June 6. Neither here nor there.

So, I did what any self-respecting grandma would do, and said, "oh well I saw a whole transit in 2004, as well as a Mercury transit in 2006. I'll survive." And I got on the plane on the morning of June 5, leaving Phoenix – and the Venus transit – behind. During a layover in New Jersey, I tried to see whether the Sun was visible, hoping to maybe arrange some kind of pinhole projector. However, the sky was totally overcast. No luck there.

But on June 1 I had received an interesting email. Some time ago I had signed up with the Harvard Microobservatory, which operates several remote-controlled robotic telescopes in Arizona and Massachusetts. The scopes are 5.5" reflectors equipped with CCD's, and the public is invited to order pictures taken through them.

The email I received on June 1 announced that the Arizona scopes of the



Photo taken by Kevin Adams at the PVCC Venus Transit Event showing Dave Hellman hiding in the shade of his umbrella.



Photo by Kevin Adams, at PVCC Venus Transit Event.
Photo is of Jenny Weitz.

observatory would be used for photographing the Venus transit, and as a subscriber I could request some of the photos. And so, even though I wasn't able to view the transit in person, on June 6 I received an email from the observatory with five photos, and a link to the whole collection: <http://tinyurl.com/bj44kx9>.

Talk about having your cake and eating it too! I enjoyed viewing the photos while rocking my baby granddaughter to sleep.

Review of the Venus Transit, 5th June, 2012.

By Chris Boar, VP Nanaimo Astronomy Society, Vancouver Island, BC, Canada.

I'd been anticipating and looking forward to the transit for the past year, unfortunately my local weather forecasts for the big day were not looking good. I decided I didn't want to risk missing this once in a lifetime event and that I was going to have to do some serious travel to ensure success. Based on forecasts and available flights, Phoenix was chosen as the destination of choice. I brought along my scope + camera to do some imaging, however United Airlines had other ideas, with my mount going awol for my entire visit.

A quick Google revealed that the local astronomy society were running a public outreach event, which I decide I was going to gatecrash. Arriving on site at T-2 hours I found Chris and Rod from the club were just beginning to set up. After an introduction I mucked in trying to help/hinder members set up for the big event. I was somewhat disheartened that I would be unable to do any imaging due to my missing mount.

With the time of first contact fast approaching I counted about 11 scopes set up. The majority were fitted with white light solar filters. 3 were Hydrogen Alpha scopes, and we even had a Solar funnel projecting an image of the sun. There were a few members of the public around, not that many which I put down to it being mid afternoon with folks at work.

It was time. 3.06pm PST. We all peered anxiously into scopes, not quite sure what we would see. For what seemed an eternity and then, there she was, we could just see the planet break the edge of the sun....first contact. Although the Newtonian laws of Planetary motion are well known I still always marvel that we know down to the minute when these events are going to happen.

From that point on it was 5 hours of looking through various scopes at the progressing transit. The views through the H-A scopes were stunning. I'm saving now to get my own. And then a moment of elation...one of the club members (Steve Machol) was photographing with a Nikon! That meant I could use my D3s for some imaging if I could sweet talk Steve into letting me use his adapter (mine was with my missing mount). Bingo! Not only was Steve kind enough to loan me his adapter, he let me hook up to his SCT scope to take some white light solar images. I then high-



Photo by Kevin Adams, at PVCC Venus Transit Event. Photo is of Albert Tucker.

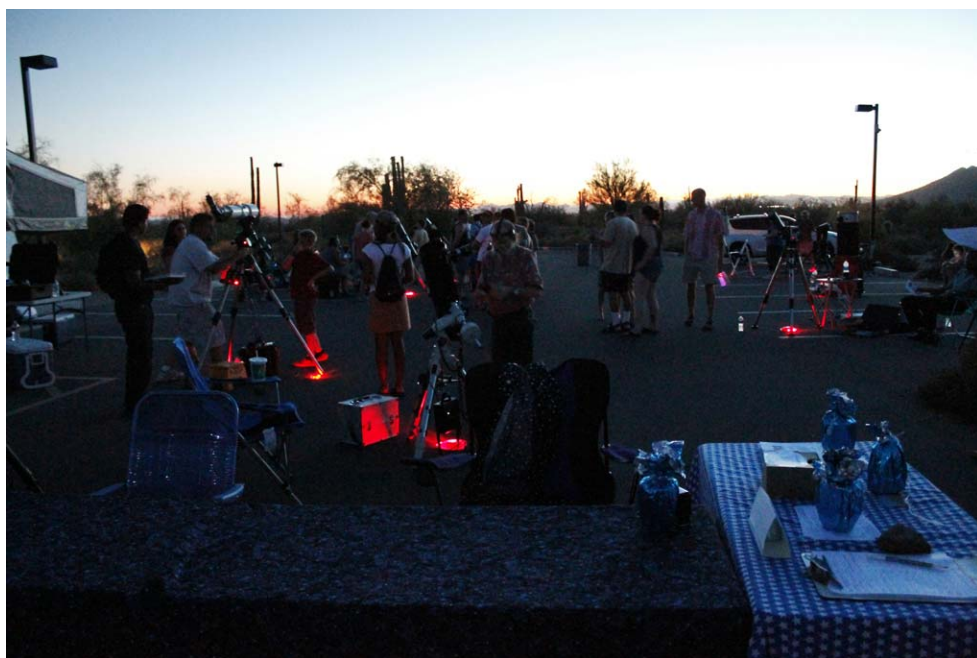


Photo by Kevin Adams, at PVCC Venus Transit Evening Star Party Event.

tailed it across to xxxxd who had his very nice Lunt H-A scope setup. After a bit of fiddling we got my Nikon hooked up and I took my first H A images.

The crowds were beginning to build as it got later. Many folks commented on how they had to be dragged reluctantly out into to the hot weather to see the transit, and it turned out to be on of the most amazing sights they'd ever seen. The crowds contin-

ued to grow, I'd estimate a couple of hundred folks saw the transit at the public event. And then it was over, about 5 hours later the sun set with the transit still in progress. A beautiful sunset over the cactuses and mountains.

After a quick bite to eat it was time for the star party, which was just as busy as the transit. I never tire of the "OMG's" and "Holy moly" when someone sees Saturn for

Review of the Venus Transit, 5th June, 2012.

the first time. And just to finish the day off, the ISS passed overhead for the finale.

A day I will never forget. A beautiful

location, great weather, friendly club members, and I made some new long time friends I hope. A special thanks to Steve Machol for allowing me to borrow his t-

adapter and scope to do some imaging, and also to xxxxd for the use of his H-A scope.

Venus Transit Reviews: Various Locations

By Various Authors

Dan Heim writes: Here is my Venus Transit animation
<http://www.dfacaz.org/astrophotos/2012-transit-Heim.html>

Marc Levison writes: Check my Venus video at marclevison.smugmug.com. Scroll to astronomy and Transit of Venus.

Tim Jones writes: Because Bob and I were stuck in the office for the start of the transit, we set up our rigs in our office parking lot. Bob used his finder scope on the bino tripod while I set up my entire 90mm rig. We were both using Baader Solar film that Bob used to create covers for the ends of the scopes. While it took me a bit longer to get things ready, we did catch first contact in Bob's newly devised "grab and Go".

We shared the views with others from the 2 office buildings and I even had 2 drive-ups where folks saw me and decided to stop and ask if they could look. One gentleman who was retired from NASA ARC said it was the best visual view of the Sun that he had ever seen. I then swapped out between my eyepiece and my EOS T1i and got to see the early portion of the transit visually and captured it with the camera.

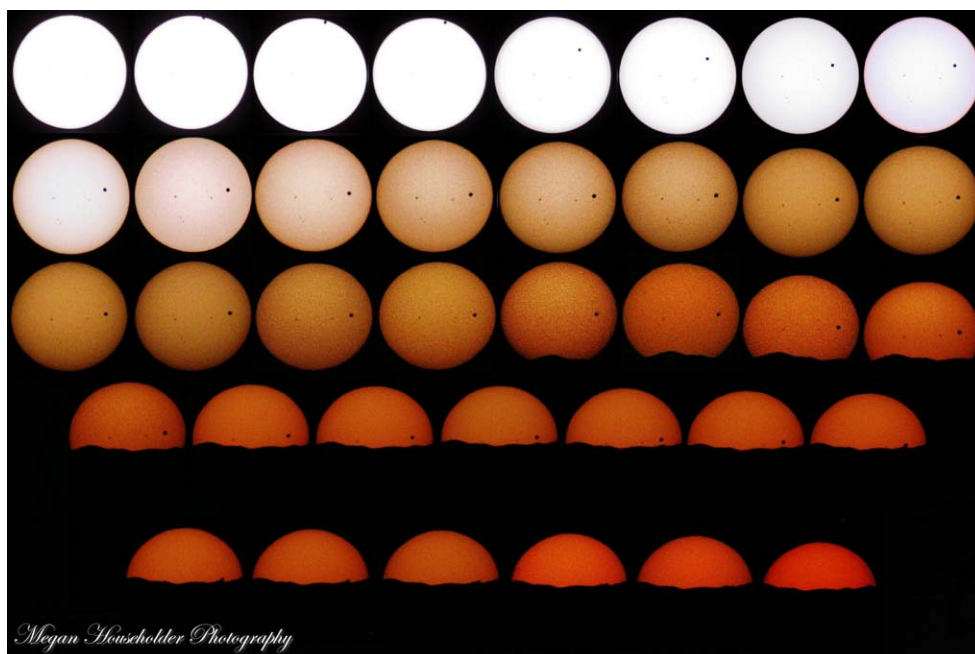
Ted Blank writes: My name is Ted Blank. I am an amateur astronomer from New Hampshire and I was lucky enough to be able to join PAS for their Venus Transit outreach event in the parking lot of PVCC in Phoenix.

Thanks to an early flight and a couple of on-time departures (and 2 free checked bags for scope and mount) on Southwest, I was in Phoenix by 10:30am on the day of the transit. A quick trip north to PVCC got me there in time for lunch at the cafe at the school while I waited for PAS to arrive. On the way up, I stopped at WalMart for a small table which came in very handy all day. (I donated it to PAS at the end of the day.) Terri welcomed me as did all the other members, and I met several other people who had flown in from places far away to escape cloudy weather.



Megan Householder Photography

Photo by Megan Householder taken at PVCC Black Mountain Campus Venus Transit Event. Megan used a Canon EOS Rebel XT with a homemade Baader White Light Solar Filter.



Megan Householder Photography

Photo by Megan Householder taken at PVCC Black Mountain Campus Venus Transit Event. Megan used a Canon EOS Rebel XT with a homemade Baader White Light Solar Filter.

I brought along an iOptron minitower alt-az mount which allows mounting of two scopes. On one side I put a Lunt 60mm Ha

scope, and on the other side I put an 80mm refractor with a homemade sun funnel made of a 12.5mm Plossl EP in a black plastic oil

Venus Transit Reviews: Various Locations

change funnel cut off to 10" in length. (See www.transitofvenus.org for details of construction.) Instead of expensive rear-projection material I used white plastic used for shrink-wrapping boats for the winter. I have miles of this stuff so if anyone wants to make a sun funnel, just send me a note.

The people coming to view the transit were very interested and several kept circling around the scopes and coming back to each of us for more views. It was a real treat to see over 4 hours of the event - back in NH we were only going to get 90 minutes before sunset, but the whole northeast was cloudy. Some of my friends saw glimpses of Venus through some cloud gaps, so I feel kind of guilty that I was able to enjoy such a large part of the transit with my new friends in Phoenix, and get a suntan as well. Saguaro cacti make a very nice background for daytime observing.

The event was very well organized and I especially enjoyed seeing how Terri met each arriving member of the public, had them sign in and answer some questions. More events should be run this way!

So thanks to PAS for making me feel welcome, and special thanks for arranging for such nice weather! It was beautiful. I know it was hot, but we had, in New Hampshire, two weeks of solid rain and clouds right though Transit day. The sight of blue sky was positively enchanting!

Yves Klein writes: For the Venus transition, we stayed here in Phoenix and used the same equipment as we did for the Solar Eclipse. It was quite a hot day, but worth it. Seeing the Venus transit was quite an experience. It was a humbling moment to see this planet about the size of earth occupy a such a small portion of the Sun's disk even though it is about 6 light minutes away from the Sun and about 2 light minutes away from us.

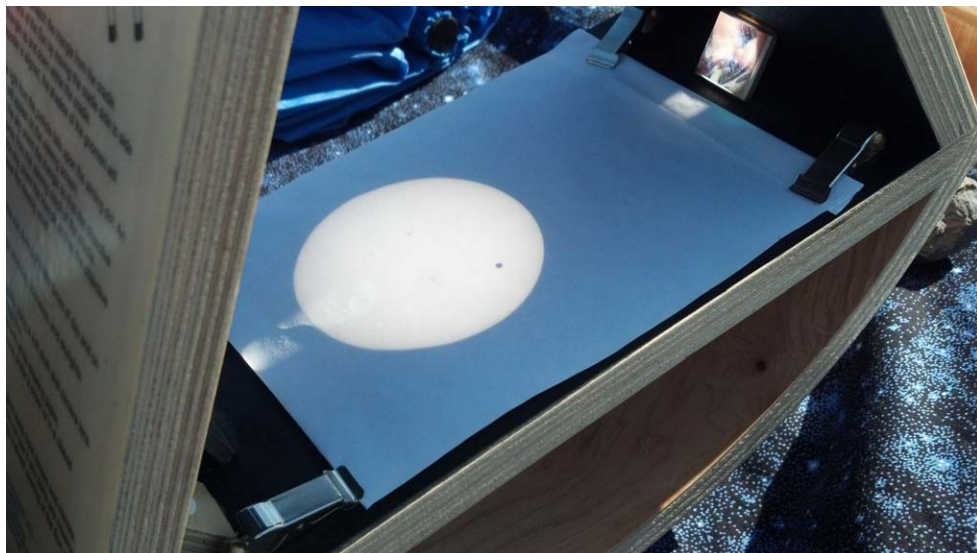


Photo taken by Dr. Laurice Dee, Friend of PAS, through her digital camera, of the Sun Spotter showing Venus crossing the face of the Sun. Taken at the PVCC Black Mountain Venus Transit Event.



Photo by Dr. Laurice Dee. This is the Venus Transit through a digital camera, of a camera taking the photo while at the PVCC Black Mountain Campus Venus Transit Event. The Camera & Telescope set up is Marc Levison's and he adds "This is my Nikon D90 body on "Live View" attached to my Orion 12 inch Dobsonian reflector with an Orion off center solar filter attached to the telescope. It is a real time "live" image of the event viewed on the camera LCD screen."

A Venus Transit Video

Submitted by Leah Sapir

Leah writes: This time-lapse video from NASA shows the June 2012 Venus transit through various telescopes. The 7-hour transit is reduced to around 10 seconds for each time the transit is shown in full. Suggestion: watch it in full screen mode and turn on your speakers! <http://tinyurl.com/oebusdo> ***

Venus Transit viewed from Portal, AZ

By Sam Insana, PAS Member

On June 5th, Vera, Frank and I showed the Venus transit of the Sun from 3:00 pm until 6:30 pm at the Southwestern Research Station in Portal, AZ. About 50 workers, volunteers, and biologists from around the world enjoyed the views of Venus, and the several solar flares, and many sunspots. We used the PST and the 8 inch newtonian reflector with filter. At 6:30 pm, the sun went down behind the mountains of Cave Creek Canyon, and some researches just coming back from work in the field, expressed disappointment that they couldn't see the event. So Frank put them in his jeep and raced up the top of the mountain on an old forest road, so they could see Venus through his eyeglasses he had left over from the annular eclipse. They loved seeing it and Frank's extra effort. The next night we put on a star party where we showed a double star cancer iota, M13 globular cluster, M81&82 galaxies, M57 ring nebula, and 51 Whirlpool Galaxy. There was only one hour of fantastic darkness, where we showed all those objects to about 50 people, and then the Moon started coming up. At that time we showed Saturn and then Frank showed the moon through his small refractor. The Southwestern Research Station so enjoyed our telescope viewing that they gave Vera and I free meals all 3 days we were in the area. Frank already got them for being a volunteer. The weather was perfect, high in the upper 80's and low in the 50's, no clouds, and very little wind.



Photo taken by Paul Schmidtke of Chris Johnson at PVCC Venus Transit Event.



Taken by Robert Fenske. Robert writes: Picture shot through an 8" scope a little before second contact. Editors Note: Robert was visiting us from San Antonio



Taken by Robert Fenske. Robert writes: Picture of the area about 50 minutes after the transit started. Not that many people around yet.



Taken by Robert Fenske. Robert writes: My best transit photo. Again I shot it through the same 8" scope.



Photo provided to PAS by Ted Blank of Ted Blank & his scope set up. Ted is a member of the NH Astronomical Society. He says he is grateful for the nice weather and warm welcome he received from PAS.



Photo provided by Ted Blank. Ted writes: This is a real-time record of where Venus actually was on the face of the Sun as the afternoon progressed



Photo By Terri Finch showing Rod Sutter blocking the Sun from the observer who is looking through Rod's PST at the PVCC Venus Transit Event.

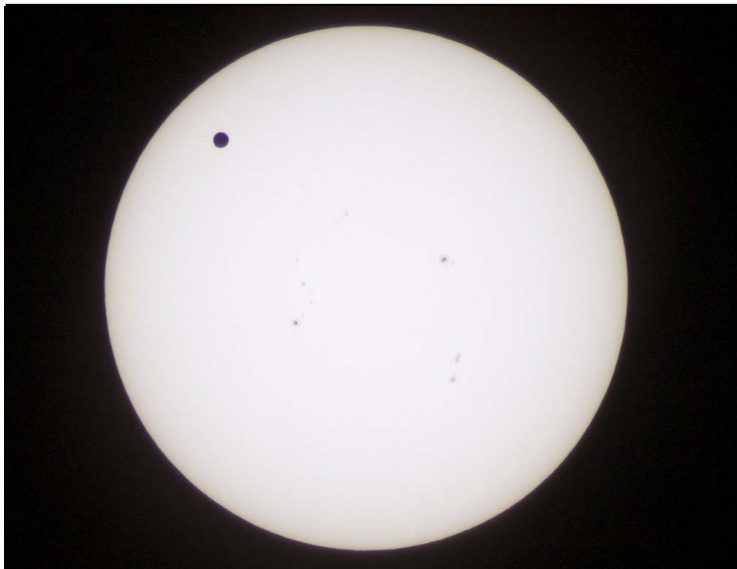


Photo taken by Tim Jones from his Office in Scottsdale using a 90MM Refractor f8, Baader film, Canon EOS T1i 1/250th sec, ISO100.

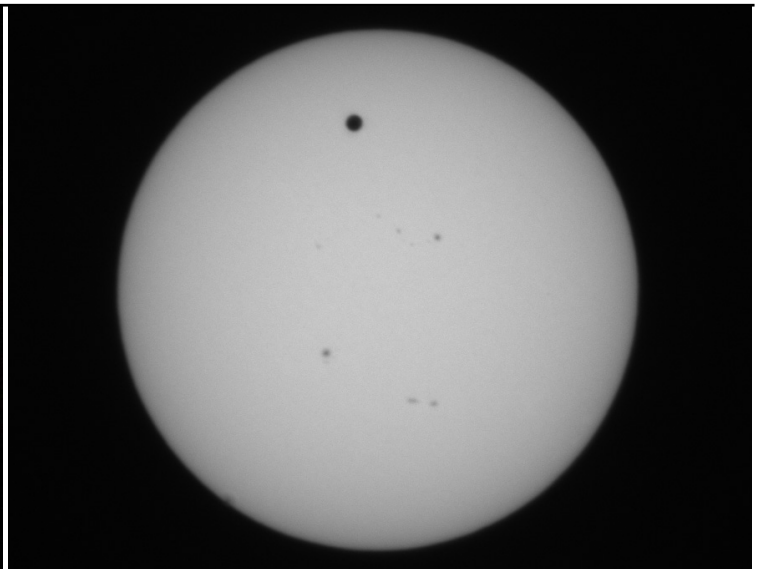


Photo by Yves Klein: Venus Transit. Canon EOS 60D camera + Solar filter.



Photo by Yves Klein. At sun set we can see Venus just below the horizontal bar of the electric post on the right side.



Photo by Yves Klein: Some grass and a bird taking off.

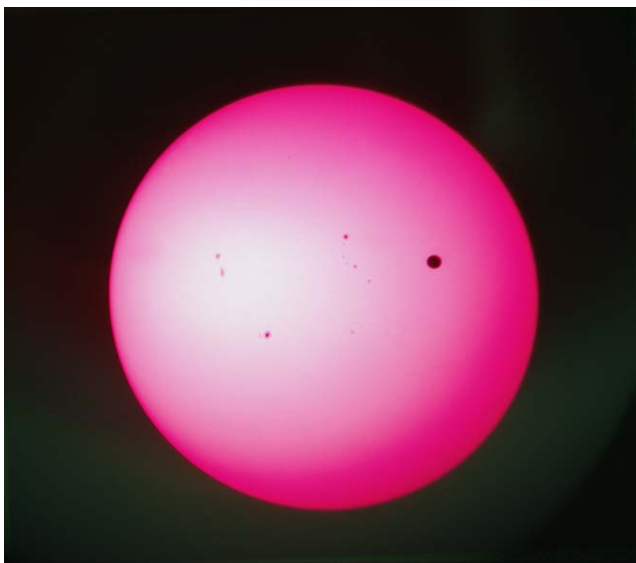
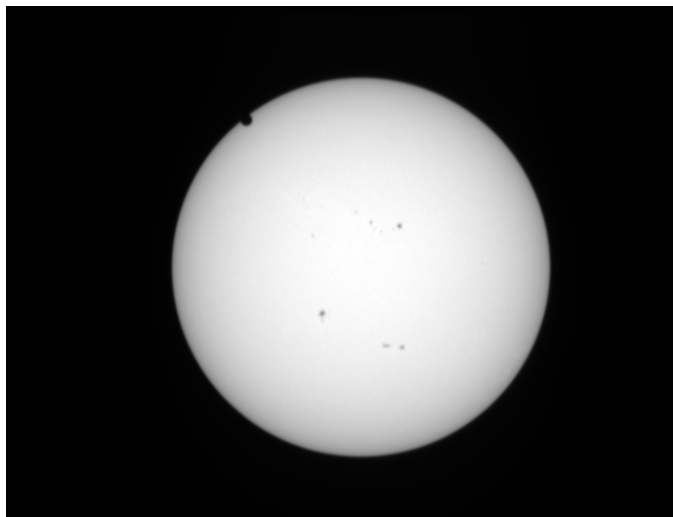


Photo by Yves Klein: Photoshop stacked of Venus Transit. Solar filter + SIII, Canon EOS 60D camera.

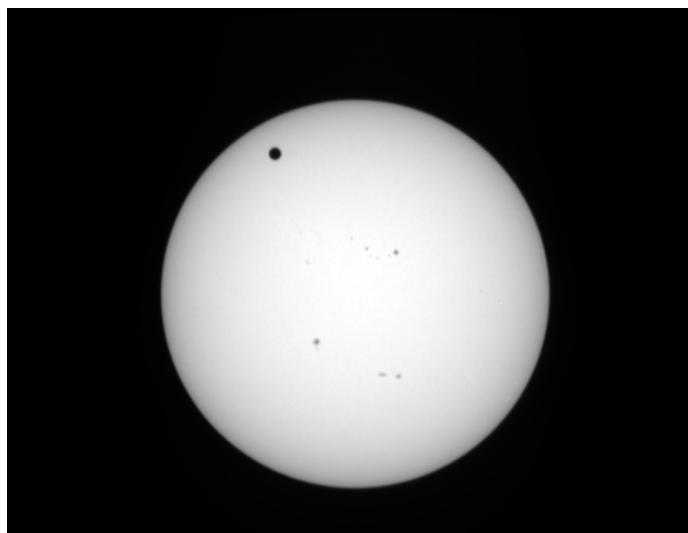


Taken by Robert Fenske. Robert writes: Another shot of the area. More crowded than the earlier shot. The telescope I took the attached transit photos through is the one on the far left side of the picture that is obscuring the head of the man in the white shirt. (Albert's Scope)

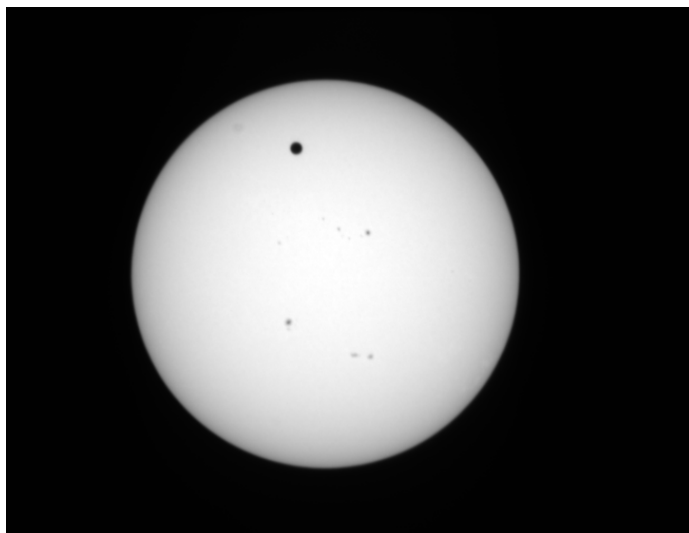
Venus Transit photos submitted by Leah Sapir



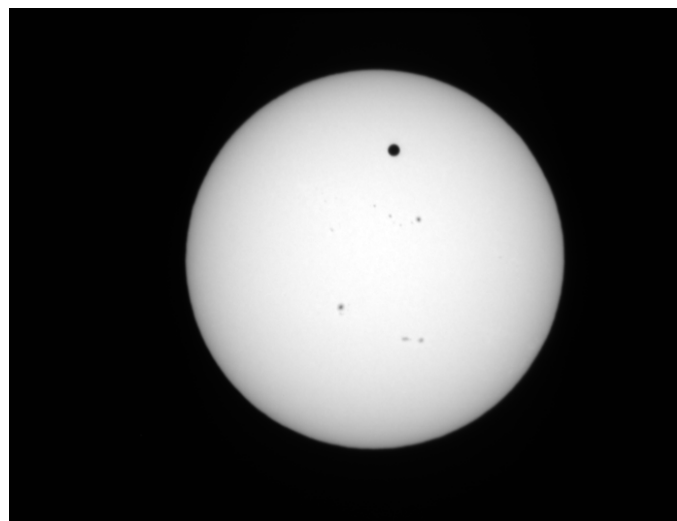
Venus transit at 2219 UT (3:19 pm MST). Photo by the Harvard Micro Observatory in Amado, AZ; submitted by Leah Sapir. S. The transit pictures were taken with a 5.5" reflector using a gray ND4 filter, exposure time 0.75 sec. Sunspots are also visible in the pictures.



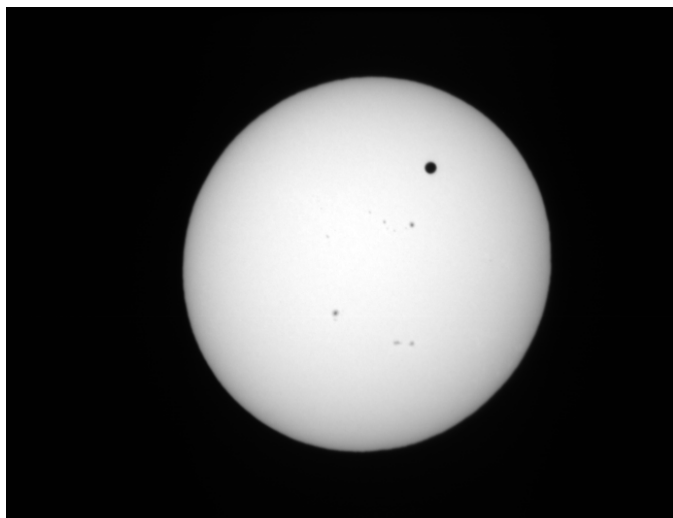
Venus transit at 2306 UT (4:06 pm MST). Photo by the Harvard Micro Observatory in Amado, AZ; submitted by Leah Sapir.



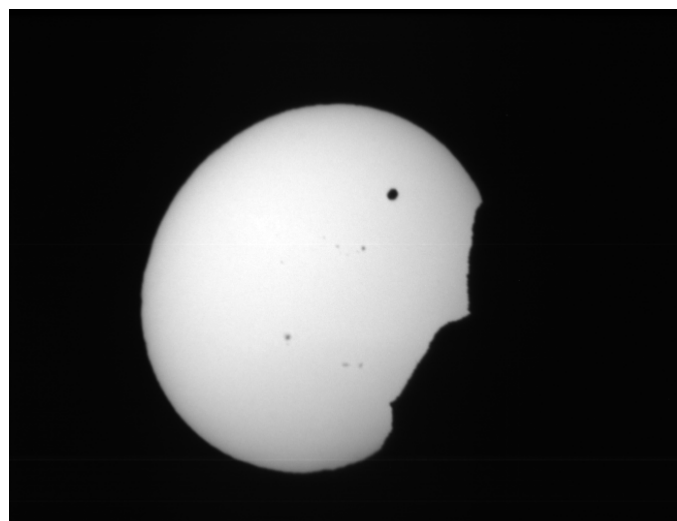
Venus transit at 0010 UT (5:10 pm MST). **Photo by the Harvard Micro Observatory in Amado, AZ; submitted by Leah Sapir.**



Venus transit at 0111 UT (6:11 pm MST). Photo by the Harvard Micro Observatory in Amado, AZ; submitted by Leah Sapir.



Venus transit at 0208 UT (7:08 pm MST). Photo by the Harvard Micro Observatory in Amado, AZ; submitted by Leah Sapir.



Venus transit at 0222 UT (7:22 pm MST); Sun setting behind Arizona mountains. Photo by the Harvard Micro Observatory in Amado, AZ; submitted by Leah Sapir.